

Aquaguide: The problem of Leaky Ponds

Missouri is a "pond state" with over 300,000 privately owned ponds and lakes. These ponds provide a source of water for humans, livestock, crops and fish. For these reasons most pond owners should be concerned about the amount of water maintained in their pond.

Throughout the course of a year, a pond's water level (even those without a leak) will drop because of evaporation, seepage, and withdrawals for household use, livestock watering and irrigation. Evaporation is surface water lost to the atmosphere. In a dry year rainfall may not replace the amount of water evaporating from the pond's surface.

Seepage is water lost through the soil. Well constructed ponds with good soil may lose one inch of water per month to seepage.

Symptoms of Leaky Ponds

The most recognizable signs of a leaking pond are rapid water level decreases or the water falling below the level expected with normal use. Wet spots and aquatic vegetation (like cattails) below the dam may be good indicators of seepage through the dam or around the drain pipe and may help determine the location of the leak.

Why Do Ponds Leak?

Understanding why ponds leak and determining the most likely cause of the leak in your pond is the first step toward a solution. Leaks in ponds usually occur because of problems in one of the following areas.

Site Selection

Topography, drainage area and soil content are the keys to making a good site selection. The pond should be located in an area with a watershed ratio between 10:1 and 15:1 (10 to 15 acres of watershed per acre of impounded water). Watershed ratios within this range will contribute an adequate amount of water to the pond without jeopardizing the structural integrity of the dam and spillway.

Soils should contain a minimum of 20 percent clay for good compaction, which prevents excess seepage. Areas containing large rock outcroppings are generally poor pond sites, because seepage often occurs through cracks or fractures in the rock.

Design Or Construction

Good pond construction is essential for preventing excess seepage. If the pond basin contains coarse-grained soil, a blanket of less permeable material (high clay content) may be necessary to prevent excess seepage. Trees and roots should be removed from the area of the dam to prevent seepage from root decay. A core trench should be excavated and backfilled with the most impervious material available at the site to prevent seepage under the dam. Once the core trench is complete, the most impervious soil remaining should be used on the water side of the dam.

Anti-seep collars should be installed on spillway and livestock watering pipes.

The dam must be wide enough at the top (10 to 12 feet for most ponds) to maintain structural integrity. The upstream side of the dam should have a slope that is not steeper than 3 to 1 and should be protected from wave erosion with grass or a rock blanket. The dam should be high enough to divert water through the emergency spillway and to prevent heavy storm runoff from overtopping the structure.

Maintenance

Maintenance is necessary to keep a pond in good working condition. The dam (front and back) should be kept free of trees and large shrubs, because decaying root systems can cause leaks. The spillway, outlet pipes and livestock watering pipes should be kept free of obstructions to prevent erosion damage.

Keep brush, debris and aquatic vegetation cleared away from the dam to discourage animals from burrowing into the dam, which can cause leaks. Check the dam for wave erosion scars. Grass may need to be planted or rock added to prevent further damage.

Environmental Factors

Drought years may also cause problems. When rainfall is below normal and the water level falls, exposed soil can dry and crack, causing leaks in the clay blanket that protects the pond basin.

Considerations

Sealing a leaky pond can be a costly endeavor, unless you can identify the exact location of the leak. The best cure for a leaky pond is prevention. Good site selection, proper design and good construction and maintenance will eliminate most problems before they start.

If you already have a pond that leaks ask yourself the following questions:

- What is the pond's intended use?
- How severe is the leak?
- Is the seep along the dam or in the basin?
- What is the best way to seal the pond?
- How much will it cost?
- Is it worth fixing?

Stopping the Leak

Reconstruction

Reconstruction is perhaps the best option for stopping a leak. However, it's also the most expensive. The pond must be drained and the basin sealed or the dam repaired. If you're considering this option, contact your local Soil Conservation Service, an engineer or a qualified

contractor with pond building experience for more information about the feasibility and cost.

Bentonite

Bentonite is another option for stopping a leak. It is perhaps the best option, if the exact location of the leak is known and if the area to be treated is not too large. Large areas can be successfully treated with bentonite but cost is a consideration.

Bentonite (common trade names Akwaseal and Volclay) is a volcanic clay that swells to about 15 times its original volume when placed in water. Mixed blanket, pure blanket and sprinkling are the three main methods for sealing a pond with bentonite.

Mixed Blanket Method

- Drain the area to be treated and remove all rocks and plant growth.
- Use 1 part granular or powdered bentonite mixed with 5 parts soil to fill large holes and crevices.
- Plow the area to be treated to a depth of 4 to 6 inches and allow soil to dry.
- Divide the area to be treated into 10 foot squares and apply 50 pounds of bentonite to each square (1/2 pound bentonite per square foot).
- When the entire area has been covered, mix the bentonite with the top 3 to 4 inches of soil, using a disc, spike tooth harrow or hand rake, and then roll or tamp to compact it.
- Sandy soil works best for mixing with bentonite because it compacts better. If clay soil is used it must be fine and without lumps.

Pure Blanket Method

- Drain the area to be treated.
- Spread powdered bentonite (unmixed with soil) at a rate of 1/2 pound per square foot over the bottom of the pond.
- Cover bentonite with 3 or 4 inches of soil, sand or fine gravel.
- This is the best method but requires the most care, because bentonite must cover the entire surface to prevent leaks.

Sprinkle Method

- The pond does not need to be drained but the exact location of the leak must be known.
- Scatter granular bentonite on the water's surface wherever seepage occurs.
- Bentonite sinks to the bottom where it swells.
- The bentonite gel that is created is drawn into the leaky seams and closes them.

- This method is not as successful as the mixed or pure blanket methods but will generally work if the location of the leak is known and enough bentonite is used.

In all methods of bentonite application, it's the swelling of the particles that stop the leak. Bentonite will not stop the leak immediately. Some seepage is to be expected for up to a week after the bentonite is applied. Bentonite will not swell in water containing large quantities of mineral salts or acids.

Bentonite is available through local farm supply stores or agricultural chemical companies. Estimated cost per 100 pound bag is \$13 (1994). If you have trouble finding bentonite, contact your nearest Missouri Department of Conservation office for further assistance.

Clay Blankets

Soil with a high percentage of clay may be spread over the entire pond basin to stop leaks. The pond basin should be drained and disced to a depth of 8 to 10 inches. Clay can then be applied to the surface and compacted. This method may be less expensive than bentonite; however, the clay blanket may need to be as deep as 12 inches to prevent seepage.

Compacting

Some leaks can be sealed by draining the pond to expose the area suspected of leaking and compacting the soil while it's still moist. Adding a thin layer of clay to this area before compaction may help when using this method.

Plastic Liners

Plastic, vinyl or butyl rubber liners are available for ponds with severe leaks. This method is very expensive (\$25 per 100 square feet and up) and will not work in all situations. Water pressure under the liner can force it away from the bottom, if the pond is spring fed or is located in an area with a high water table. Muskrats and other burrowing animals, as well as livestock, will also puncture the liner. Liners must be replaced every few years.

Trampling

Turning the pond basin into a hog-wallow for a time can seal leaks. This method, however, is not recommended, because the excessive nutrients placed in the pond basin by livestock can cause excess aquatic plant growth and may make the water unfit for fish, livestock and human consumption.

QUESTIONS?

To find out how well soil in your area holds water contact your local Soil Conservation Service.

For more information and other assistance when structural (building or reconstruction) work on your pond is necessary, contact the Soil Conservation Service, an engineer or a qualified contractor.

If you have additional questions about leaky ponds please contact your nearest Missouri Department of Conservation office.